

From inquiry amongst the Bedouins and European residents in Palestine, it was ascertained that during the early summer the level of the sea falls at least 6 feet below the level at which it stood on the day the levelling was taken, which would make the depression 1298 feet; and we may conclude that the maximum depression at no time exceeds 1300 feet. Lieut. Symonds, R.E., in 1841, made the depression 1312·2 feet.

The soundings in the Dead Sea by Lieut. Vignes of the French Navy, gave a maximum depth of 1148 feet, making the depression of the bottom of the Dead Sea 2446 feet below the level of the Mediterranean. The soundings in the Mediterranean, midway between Malta and Candia, by Captain Spratt, R.N., gave a depth of 13,020 feet, or a depression of the bottom five times greater than that of the bottom of the Dead Sea.

The levelling was executed by two independent observers, and from a comparison of the two sets of levelling, it is certain that the levels have been obtained with absolute accuracy to within 3 or 4 inches.

The establishment of a chain of levels across the country with bench marks cut on so many points, cannot but prove of the utmost importance for any future investigations, or for any more extended surveys in Palestine, such as are contemplated by the Society which has been formed since this survey was made, "for the accurate and systematic investigation of the archæology, the topography, the geology, and physical geography, &c. of the Holy Land, for Biblical illustration."

For the survey of Jerusalem itself, it was of the utmost importance, as it enabled us to connect all the levels in and about the city with the level of the Mediterranean, and to harmonize, so to speak, all the levels which have been taken.

## II. "Note on the Amyl-Compounds derived from Petroleum."

By C. SCHORLEMMER. Communicated by Professor ROSCOE.  
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In a former communication I have shown that the hydride of heptyl obtained from petroleum has a higher specific gravity than its isomers ethyl-amyl, and hydride of heptyl from azelaic acid. The same is the case with their derivatives, and some of these isomeric compounds also show considerable differences in their boiling-points\*. I could not compare the different heptyl-compounds which I prepared with those of heptyl-alcohol formed by fermentation, as the latter substance is very little known, and I therefore considered it interesting to compare the amyl-compounds from fusel-oil with those obtained from petroleum. From the latter substance I prepared a considerable quantity of pure hydride of amyl, which boiled constantly at 33°–35° C.; and I did not succeed in lowering the boiling-point any further. From this hydride other amyl-compounds were obtained in exactly the same way as the heptyl-com-

\* Proc. Roy. Soc. vol. xiv. p. 464.

pounds. Pure amyl-compounds from fusel-oil were also prepared with the greatest care, and their specific gravities and boiling-points compared, under exactly the same circumstances, with the compounds prepared from petroleum. The results of this investigation are contained in the following Table :—

| <i>Amyl-Compounds.</i> |                |                   |                        |                   |  |
|------------------------|----------------|-------------------|------------------------|-------------------|--|
| <i>From fusel-oil.</i> |                |                   | <i>From petroleum.</i> |                   |  |
|                        | Boiling-point. | Specific gravity. | Boiling-point.         | Specific gravity. |  |
| $C_5H_{12}$            |                |                   | 34° C.                 | 0·6263 at 17°     |  |
| $C_5H_{11}Cl$          | 101° C.        | 0·8750 at 20°     | 101° C.                | 0·8777 at 20°     |  |
| $C_5H_{11}O$           | 140° C.*       | 0·8733 at 15°     | 140° C.                | 0·8752 at 15°     |  |
| $C_5H_{12}O$           | 132° C.        | 0·8148 at 14°     | 132° C.                | 0·8199 at 14°     |  |

It appears from this Table that the boiling-points of the same compounds agree perfectly, and that the specific gravities show only very small differences, those of the substances obtained from petroleum being a little higher. This is easily accounted for by an admixture of higher boiling compounds, which towards the end of the distillation raise the boiling-points a little, and which cannot be removed completely, even by long-continued rectifications. The amyl-compounds from petroleum and those from fusel-oil are therefore identical.

### III. "On a New Series of Hydrocarbons derived from Coal-tar."

By C. SCHORLEMMER. Communicated by Professor ROSCOE.

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The light oils obtained by the destructive distillation of Cannel-coal at a low temperature, contain, besides the hydrocarbons of the marsh-gas and benzol series, other substances, which are attacked by concentrated sulphuric acid. If the oil, which has been repeatedly shaken with this acid, be subjected to distillation, the hydrocarbons which are unacted upon volatilize first, and a black tarry liquid, equal in bulk to about half the crude oil, remains behind †. On heating this residue more strongly, a brown oil, having an unpleasant smell, comes over at about 200° C.; the temperature rises gradually up to 300° C., and at last a black pitchy mass is left in the retort. Even after repeated rectifications the oil always leaves a solid black residue behind, and it was only by continued fractional distillations over solid caustic potash and metallic sodium, that I succeeded in isolating substances possessing nearly a constant boiling-point and volatilizing almost completely. The compounds which I thus obtained from Cannel-coal oil, boiling below 120° C., are hydrocarbons of the general formula  $(C_nH_{2n-5})_2$ , as the following analyses and determinations of the vapour-densities show :—

\* The boiling-point of acetate of amyl is given very differently by different observers (Cahours found 125°, Landolt 133–134°; Pogg. Ann. vol. cxvii. p. 554). My observation agrees perfectly with that of Wanklyn (Chem. Soc. Journ. (2.) iii. p. 30).

† Journ. Chem. Soc. vol. xv. p. 420.